## REMARKS

The present Amendment amends claims 1, 11-20, leaves claims 2-8 unchanged and cancels claims 9 and 10. Therefore, the present application has pending claims 1-8 and 11-20.

The drawings stand objected to due to informalities noted by the Examiner in paragraph 1 of the Office Action. Filed on even date herewith are Proposed Drawing Corrections to correct the informalities noted by the Examiner. Therefore, this objection is overcome and should be withdrawn.

The specification stand objected to due to informalities noted by the Examiner in paragraph 2 of the Office Action. Filed on even date herewith is a Substitute Specification correcting the informalities noted by the Examiner. Therefore, this objection is overcome and should be withdrawn.

Claims 12-19 stand objected to due to informalities noted by the Examiner in paragraphs 3 and 4 of the Office Action. Various amendments were made throughout claims 12-19 to correct the informalities noted by the Examiner. Therefore, this objection is overcome and should be withdrawn.

Claims 9 and 10 stand rejected under 35 USC §112, second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regards as their invention. Particularly, the Examiner alleges that the recitation of a Fibre Channel (FC), storage device or a Serial Advanced Technology Attachment (SATA) storage device in claims 9 and 10 is indefinite since "component specifications are improper claim limitations". The Examiner alleges that the "design, construction, material composition, performance, etc., of these interface specifications can be updated or altered at anytime". Applicants submit that component

specifications, particularly when they describe a particular type of apparatus, are appropriate limitations in claims 9 and 10 since it identifies Applicants invention as using a particular type of apparatus FC or SATA storage device rather than, for example, R/W CD ROM storage devices. As indicated above, claims 9 and 10 were canceled. However, the subject matter of claims 9 and 10 were added to the independent claims. Therefore, this rejection with respect to claims 9 and 10 is rendered moot but is traversed with respect to the independent claims to which the subject matter of claims 9 and 10 were added. Accordingly, reconsideration and withdrawal of this rejection is respectfully requested.

In the independent claims the type of storage device being recited is either a FC storage device of a SATA storage device. The specifications for each of these types of storage devices has a fixed portion such as, for example, the interface. The interface for these specifications are fixed since such types of storage devices must be forwards and backwards compatible to be fully operational at all times in all types of systems.

In addition, these types of storage devices are well known to those of ordinary skill in the art and as such one of ordinary skill in the art would fully appreciate and recognize the distinguishing characteristics of any limitation in the claims which recite that the storage device is a FC storage device rather than a SATA or ATA storage device and vice versa. In fact, definitions for such types of storage devices can be found in any electronics or computing dictionaries. For example, attached are a couple of articles which describe different types of storage devices that are well known to those of ordinary skill in the art, namely FC and SATA storage devices. As is clear from the

attached articles, such storage device can be purchased and used in a system such as that recited in the claims of the present application.

Therefore, based on the above, the recitations in the claims regarding the FC or SATA storage devices are appropriate and should be given patentable weight.

Claims 1-3, 6, 7 and 11 stand rejected under 35 USC §102(e) as being anticipated by Suzuki (U.S. Patent No. 7,051,216). Applicants note that Suzuki is assigned to the same Assignee as the present application and that Suzuki is a reference that qualifies for prior art purposes under 35 USC §102(e). The Examiner is informed that as result of the present response in which the claims are amended to more clearly describe the present invention, if the Examiner attempts to use Suzuki to form an obviousness type rejection, then said rejection would be inappropriate in accordance with 35 USC §103(c).

The 35 USC §102(e) rejection of claims 1-3, 6, 7 and 11 is traversed for the following reasons. Applicants submit that the features of the present invention as now more clearly recited in claims 1-3, 6, 7 and 11 are not taught or suggested by Suzuki whether taken individually or in combination with any of the other references of record. Therefore, Applicants respectfully request the Examiner to reconsider and withdraw this rejection.

Claims 1-6, 8-11 and 20 stand rejected under 35 USC §102(e) as being anticipated by Oomori (U.S. Patent Application Publication No. 2004/0003306); and claims 7, 12-14, 18 and 19 stand rejected under 35 USC §103(a) as being unpatentable over Oomori. As indicated above, claims 9 and 10 were canceled. Therefore, this rejection with respect to claims 9 and

10 is rendered moot. These rejections with respect to claims 1-8, 11-14 and 18-20 is traversed for the following reasons. Applicants submit that the features of the present invention as now more clearly recited in 1-8, 11-14 and 18-20 are not taught or suggested by Oomori whether taken individually or in combination with any of the other references of record. Therefore, Applicants respectfully request the Examiner to reconsider and withdraw these rejections.

Amendments were made to the claims so as to more clearly describe features of the present invention not taught or suggested by any of the references of record whether taken individually or in combination with each other. Particularly, amendments were made to the claims to more clearly recite that the present invention is directed to a storage system which can be connected to a host computer having a plurality of storage devices which store data from the host, a plurality of housings in which the storage devices are mounted and a plurality of first power supplies which supply a voltage to the storage devices.

According to the present invention, at least one of the housings has a first voltage converter which receives power having a first voltage value from the first power supply, converts the first voltage value into a second voltage value different from the first voltage value, and supplies power having a single voltage value to the storage device.

Further, according to the present invention any of the storage devices is a Fibre Channel (FC) storage device having a FC interface and any of the other storage devices is a Serial Advanced Technology Attachment (SATA)

storage device having a serial interface and the first voltage converter connected to the SATA storage device has a FC/SATA converter.

The above described features of the present invention now more clearly recited in the claims are not taught or suggested by any of the references of record whether taken individually or in combination with each other. Particularly, the above described features of the present invention are not taught or suggested by Suzuki or Oomori whether taken individually or in combination with any of the other references of record.

Suzuki teaches a disk array device and method for supplying power to the disk array device to which power is supplied by at least two AC inputs. As taught by Suzuki, at least two AC/DC power supply groups are provided in correspondence with each of the AC inputs and each AC/DC power supply group includes at least two AC/DC power supplies that are connected to the AC input corresponding to that group. Outputs from the AC/DC power supply are summed separately for each group to obtain group total outputs for each group and the groups total outputs are input to each of the plurality of loads in the disk device to provide power to each load.

Suzuki specifically teaches, for example, the use of hard disk drives (HDD) a DC/DC converter and a HDD unit are provided, as illustrated in Fig. 1 thereof. The Examiner's attention is directed to the apparatus taught by Suzuki in Fig. 1 wherein the HDD housing 200 includes an HDD unit 210 and a DC/DC converter 220.

However, at no point is there any teaching or suggestion in Suzuki wherein a mixed HDD environment can exist such as, for example, the HDD housing including a DC/DC converter, an FC converter for a FC disk drive and

a FC/SATA converter for a SATA disk drive as in the present invention as recited in the claims.

Thus, Suzuki fails to teach or suggest a plurality of housings in which a plurality of storage devices are mounted and a plurality of first power supplies which supplies a voltage to the storage devices such that at least one of the housing has a first voltage converter which receives power having a first voltage value from the first power supply, converters the first voltage into a second voltage value different from the first voltage value and supplies power having a single voltage value to the storage device as recited in the claims.

Further, Suzuki fails to teach or suggest that any of the storage devices is a FC storage device having a FC interface and any other of the storage devices is a SATA storage device having a serial interface and that the first voltage converter connected to the SATA storage device has a FC/SATA converter as recited in the claims.

Therefore, Suzuki fails to teach or suggest the features of the present invention as now more clearly recited in the claims. Accordingly, reconsideration and withdrawal of the 35 USC §102(e) rejection of claims 1-3, 6, 7 and 11 as being anticipated by Suzuki is respectfully requested.

The above described deficiencies of Suzuki are also evident in Oomori. Oomori merely discloses, for example, in Fig. 1 thereof a server 11 having a disk unit 114, and a DC/DC converter 117. However, at no point is there any teaching or suggestion in Oomori of a storage system as in the present invention having an HDD housing which can include a DC/DC converter which powers all elements of the server 11 not just the HDD unit, and a FC/SATA

converter for use with a SATA disk device as in the present invention as recited in the claims.

Thus, Oomori fails to teach or suggest a plurality of housings in which storage devices are mounted and a plurality of power supplies which supply a voltage to the storage devices, wherein at least one of the housings has a first voltage converter which receives power having a first voltage value from the first power supply, converts the first voltage value into a second voltage value different from the first voltage value and supplies power having a single voltage value to the storage device as recited in the claims.

Further, Oomori fails to teach or suggest that any of the storage devices is a FC storage device having a FC interface and any other of the storage devices a SATA storage device having a serial interface and that the first voltage converter connected to the SATA storage device has a FC/SATA converter as recited in the claims.

Therefore, Oomori fails to teach or suggest the features of the present invention as now more clearly recited in the claims. Accordingly, reconsideration and withdrawal of the 35 USC §102(e) rejection of claims 1-6, 8, 11 and 20 as being anticipated by Oomori and reconsideration and withdrawal of the 35 USC §103(a) rejection of claims 7, 12-14, 18 and 19 as being unpatentable over Oomori are respectfully requested.

The remaining references of record have been studied. Applicants submit that they do not supply any of the deficiencies noted above with respect to the references utilized in the rejection of claims 1-14 and 18-20.

Applicants note the Examiner's indication in paragraph 12 of the Office Action that claims 15-17 would be allowable if rewritten in independent form

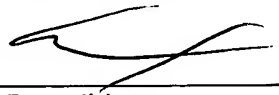
including all the limitations of the base claim and any intervening claims. Amendments were made to claims 15-17 to place them in independent form including all the limitations of the base claim and any intervening claims. Therefore, claims 15-17 are allowable as indicated by the Examiner.

In view of the foregoing amendments and remarks, applicants submit that claims 1-8 and 11-20 are in condition for allowance. Accordingly, early allowance of claims 1-8 and 11-20 is respectfully requested.

To the extent necessary, the applicants petition for an extension of time under 37 CFR 1.136. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, or credit any overpayment of fees, to the deposit account of MATTINGLY, STANGER, MALUR & BRUNDIDGE, P.C., Deposit Account No. 50-1417 (1309.43669X00).

Respectfully submitted,

MATTINGLY, STANGER, MALUR & BRUNDIDGE, P.C.



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## Our guide to hard disk drive types & hard disk drive connections. Which hard disk drive is best for you.

Hard disk drives & connection types. Hard disk drive connections: IDE, ATA, SCSI, Ultra SCSI, Ultra SCSI 160, Fibre channel, IEEE 1394, FireWire, iLink, USB, RAID. Our straightforward & general guide to hard disk drives that are available & hard disk drive connection types.

## Types of hard disk drive connections.

**IDE.** IDE or Integrated Drive Electronics uses the ATA (AT Attachment interface) for cable lengths up to 2 feet. A single IDE ATA channel can support up to two drives, master & slave. IDE can only access one drive per channel at a time. There are three IDE drive capabilities, IDE ATA33, IDE ATA66 and the latest IDE ATA100. These refer to the peak bandwidth of each type, so IDE ATA33 = 33MB/s, IDE ATA66 = 66MB/s, & IDE ATA100 = 100MB/s. IDE ATA66 & IDE ATA100 use a special 80-pin cable. ATA133 = 133MB/sec.

Actual performance of hard disk drives using IDE ATA is such that there are no hard drives that can use the entire 66MB/s of the IDE ATA66 bandwidth today. Most hard disk drives barely use the 33MB/s bandwidth that is available in the IDE ATA33, it is only the hard disk drives cache that can make use of the increased bandwidth to give you increased performance. Serial ATA uses two wires. One wire sends and receives data to and from the IDE hard disk drive at 1.5GB/s and faster.

**SCSI.** SCSI can be up to 12 meters. Narrow SCSI has 8 addresses, wide SCSI has 16. SCSI can support up to 15 devices on a single bus & bus speeds range from Ultra SCSI at 20MB/s to Ultra 160 SCSI at 160MB/s with further increase on the way.

**Fibre.** Fibre channel interface is similar to switched Ethernet & InfiniBand as it is not only for connecting hard disk drives but also peripherals in a system. Fibre is also used for networking, sharing drive resources and other high-bandwidth needs. Fibre channel is often used to connect a SCSI RAID or RAID's to a network, workstations or servers. Fibre channel gives 106MB/s or 1.06Gbps. The next generation of Fibre channel will be 212MB/sec or 2.12Gbps. Some Ultra High-end Fibre channel drives use multiple Fibre channels at once to give even higher bandwidth. Fibre channel can be up to 10 kilometres with fibre optic cabling, less with copper cabling.

**IEEE 1394.** IEEE 1394, Apple's name (FireWire), Sony's name (iLink) is now becoming popular for digital video data transfer and other devices that need a higher bandwidth than USB such as, scanners, networking, digital cameras. IEEE FireWire can support up to 63 devices on a single 50MB/s channel. IEEE 1394b will support 100MB/s per channel. IEEE FireWire is hot pluggable so you do not have to switch your computer off & on if you want to connect a FireWire device. It does not provide power to devices. FireWire supports plug & play.

**USB 1.1.** USB, Universal Serial Bus. USB 1.1 has a data rate of about 1.5MB/s for approximately 5 meters. A single USB channel can have 127 devices connected in either pass through or using USB hubs. USB uses a Master controller. This means that any signal sent from one device to another must pass through the USB controller on the PC and then back to the other device. USB devices cannot be shared by more than one computer. Two computers would have to be networked together via a USB bridge device if you wanted to share USB devices between computers. USB is hot pluggable as with IEEE 1394 and can supply power for USB devices. USB2 will increase the bandwidth to 60MB/s.

**RAID.** RAID, Redundant Array of Inexpensive Disks. RAID is an interface like IDE or SCSI. RAID is a protocol or system for using existing IDE or SCSI drives and generally has two purposes. To increase speed and/or reliability. Main types of RAID are: RAID 0, 1, & 0+1. RAID 0 uses two hard drives at once, reading & writing from both at once. RAID 1 uses two hard disk drives but mirrors the data on the first drive to the second drive. RAID 0+1 uses four hard disk drives where the second two drives are mirrors.

**RECOMMENDATIONS.**
IDE gives you perhaps the best combination between price and performance for a general purpose home or small business PC computer, especially with the increase in speed of modern IDE hard disk drives. But, if your needs are for greater performance and more connectability then SCSI drives & devices will be the best choice for home, business, server.

**General Hard disk drive terms.**
**Areal Density:** Measured in bytes/sq. inch. Refers to how densely packed the information is on the hard disk drives platters is. Higher densities give greater storage per size and reduce time to get the data.

**Cache:** Is a buffer between the hard disk drive and the bus. Cache's between 512k and 4MB are usual and play an important part in the performance of the hard disk drive.

**MTBF:** Mean Time Between Failure. How long the hard disk drive is expected to last. Needless to say, the higher the better. IDE hard disk drives tend to be lower than SCSI hard disk drives.

**Platter:** This is the actual disk of a hard disk drive and drives can and do have more than one platter.

**Rotational Speed:** Measured in RPM. Range between 4,200rpm to 15,000rpm. Standard IDE hard disk drive being 7,200 rpm while SCSI hard disk drives being 10,000rpm and now 15,000rpm.

**Seek Time:** This is the time the hard disk drive takes to find the track on the disk (platter). You will see either track to track seek time, or an average seek time.

# Hardware
# OEM Equipment

## Hard Drive Manufacturers

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## Computer Hard Drive Types

This is a general listing of Personal Computer Hard Disk Drive [HDD] manufacturers. The different types of disk drive bus interface types are listed below. Keep in mind that the IDE drives, Parallel ATA [PATA], Bus is being replaced by the Serial ATA: [SATA] bus. Most drives being offered are still IDE as of 2005.
**Internal Interface types;** ATA [IDE], Ultra ATA, SATA [Desk-top], SCSI, Ultra SCSI, Serial SCSI [Enterprise]
**External Interface types;** SATA [Desktop], SCSI, Serial SCSI [SAS] [Enterprise], Fibre Channel [Enterprise], Firewire, or USB



The four common Hard Disk Drive applications are Desk Top Computers, enterprise servers, workstations, and notebook computers.
Laptop Computers are normally the slowest and smallest
Desk Top Computers are middle of the range speed drives
Workstations use high-end disk drives
Enterprise servers use the fastest and most expensive hard drives

The four common physical drive sizes are 0.85 inch, 1.8 inch, 2.5 inch, and 3.5 inch.
0.85 inch drives are 0.13" x 0.94" x 1.26" [example size]
1.8 inch drives are 0.315" x 2.12" x 3.09" [example size]
2.5 inch drives are 0.370" x 2.75" x 3.94" [example size]
3.5 inch drives are 1.000" x 4.00" x 5.74" [example size]

The three common disk rotation speeds are 5400 rpm, 7200 rpm, and 10000 rpms
5400 rpm Hard Disk Drives found in note book computers
7200 rpm Hard Drives found in desk top computers
10000 rpm Drives found in work stations, enterprise systems

## Computer Hard Disk Drive Manufactures

Adtron Corporation {SATA 2.5", SCSI 2.5"/3.5", Solid State IDE 2.5" UDMA-100, IDE 3.5" UDMA-66, RAID}

Fujitsu {Mobile IDE, SATA - Enterprise SAS}

Hitachi {Server Drives ~ Ultra320 SCSI, SATA II, ATA-5, 3.5", 2.5", 1.8 inch hard disk drive}

HP {SATA, ATA/100, SAN}

Maxtor {SATA/150, Ultra ATA/133, External Hard Drives}

Quantum {Disk-based backup systems-Networks}

Samsung {Hard Disk Drive SATA, SAS, Ultra ATA - 100}

Seagate Disc Storage {Serial Attached SCSI (SAS), Ultra320 SCSI and 2 Gbits/sec Fibre Channel interfaces, SATA, Ultra ATA/100}

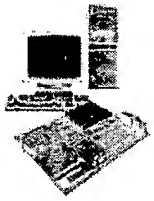
Toshiba Hard Drives {0.85", 1.8" 100MBps Ultra DMA, 2.5 inch ATA-2/3/4/5/6 interface}

Western Digital Corp. {SATA 150MBps, SATA 300MBps, EIDE Drive, Enterprise, Desktop, Mobile, External Hard Disk Drives}



Personal Computer Hard Drives use a number of different types of electrical interface buses to interconnect the physical harddrive to the PC's mother board. The most common interface is the IDE (Integrated Drive Electronics) bus; how ever the specification is more correctly known as the ATA (Advanced Technology Attachment) interface. A description of the IDE/ATA bus may be found on the Bus Design; IDE Bus page. The second most common electrical interface is the SCSI bus. A description of the SCSI [Small Computer Systems Interface] bus may be found on the Bus Design; SCSI Bus page. Both bus types listed above are parallel buses, serial versions are also available. Refer to the Personal Computer Buses page for links to all the different possible electrical interfaces.

**Engineering Design Key words:** SCSI, SAS, ATA, SATA, ATA Interface Bus, Ultra ATA, UATA, IDE, Advanced Technology Attachment, Integrated Drive Electronics, ATAPI, AT Attachment with Packet Interface Extension, Parallel bus, Personal Computer, PC, IBM Compatible, Hard Drive, Floppy Drive, Interface Standard Data Bus, Standard, Specification, Spec, Interface, IC, Physical Interface, Physical Layer, Harddrive, Disk Drive Interface, RAID Controller, Description, Pinout, Pin out, Signal Names, Direct Attached Storage [DAS], Networked Attached Storage [NAS], Storage Area Network [SAN]



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Distributors Components Equipment Software Standards Buses Design Reference

Last Modified 10/15/06